In the Numbers:

Detecting Fraud Through Data Analytics

Presented by:

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Agenda

1. Introductory Case Study

2. Goals of Data Analytics

3. Designing Data Analytics

4. Vendor Fraud

5. Credit Card Schemes

6. Payroll Fraud

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Case Study

Eddie*, the Buyer

- Buyer for large organization.

- Specialized in Maintenance, Repair and Operations ("MRO") Supplies*

✦ Although the case study is real, the name and types of product have been changed.

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Case Study

Eddie, the Buyer

- Handled Millions of Dollars of Purchases.

- Disgruntled – Feeling Underpaid.

- Daughter in Bad Neighborhood.

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Case Study

Richard, the Supplier

- Lives beyond his means. Buys luxury items while headed for bankruptcy.

- Undergoing a divorce. Uses cocaine.

- Meets Eddie and they concoct a scheme.

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Case Study

Eddie, the Buyer

- Arranges for standard 10% kickback.

- Convinces self that the organization is not losing money.

- Rationalizes that others make more money than he.

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Case Study

Eddie, the Buyer

- Terminates the previous suppliers of MRO Supplies.

- Awards Richard the business.

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Case Study

John, Buyer of Richard's Assets

- Richard goes bankrupt.

- John finds in boxes three canceled checks from Richard to Eddie. Checks were for small amounts of money.

- John notifies executive manager in organization.

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Case Study

The Response

- Full investigation is launched.

- Our team obtains data on all of Eddie's purchases.

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EDDY'S PURCHASES

Part #	Vendor #	2004	2005	2006	2007	2008	2009	2010	2011	2012
R107000B02	A234	$3.40	$3.40	$3.40	$3.40	$3.40	$3.40	$3.40	$3.40	$3.40
R110000B02	A259	$4.44	$4.64	$5.33	$4.93	$4.94	$6.22	$5.78	$6.59	$5.70
R112000014	B001	$1.69	$1.64	$1.75	$1.69	$1.87	$2.17	$2.17	$2.22	$2.12
R105000000	B034	$0.47	$0.46	$0.49	$0.47	$0.52	$0.60	$0.60	$0.62	$0.59
R116000002	B035	$3.80	$3.69	$3.98	$3.79	$4.21	$4.87	$4.86	$4.99	$4.78
R112000015	B123	$1.94	$1.88	$2.02	$1.94	$2.15	$2.49	$2.48	$2.66	$2.44
R116000001	C163	$29.70	$28.84	$30.98	$29.64	$32.89	$38.91	$38.00	$38.90	$37.34
R124000U00	C234	$6.80	$6.60	$7.90	$6.79	$7.53	$8.72	$8.70	$8.93	$8.55
R120000002	C346	$4.95	$4.81	$5.16	$4.94	$5.48	$6.35	$6.33	$6.33	$6.22
R114000014	C834	$2.50	$2.43	$2.61	$2.49	$2.77	$3.20	$3.30	$3.38	$3.14
R112000B02	D234	$7.18	$7.51	$8.62	$7.97	$4.94	$10.05	$9.35	$10.66	$9.22
R121000001	D235	$5.58	$5.42	$5.82	$5.57	$6.18	$7.15	$7.14	$7.32	$7.03
R112000U02	K143	$1.94	$1.88	$2.02	$1.94	$2.15	$2.49	$2.49	$2.55	$2.44
R112000012	K234	$1.69	$1.69	$1.69	$1.69	$1.69	$1.69	$1.69	$1.69	$1.69
R113000U02	K234	$2.34	$2.27	$2.44	$2.34	$2.59	$3.00	$2.99	$3.07	$2.94
R116000U02	K932	$3.80	$3.69	$3.96	$3.79	$4.21	$4.87	$4.86	$4.86	$4.78
R116000U00	L011	$3.37	$3.27	$3.50	$3.36	$3.73	$4.32	$4.31	$4.42	$4.24
R113000U00	L043	$2.05	$1.99	$2.14	$2.05	$2.27	$2.63	$2.62	$2.69	$2.56
R120000U02	N123	$4.95	$4.81	$5.16	$4.09	$5.48	$6.35	$6.33	$6.50	$6.22
R121000U02	N323	$5.58	$5.42	$5.82	$5.57	$6.18	$7.15	$7.14	$7.32	$7.02
R110000003	N434	$1.25	$1.21	$1.30	$1.25	$1.38	$1.60	$	$	1.57
R116000U03	U635	$3.37	$3.37	$3.37	$3.37	$3.37	$3.37			$3.37
R121000U03	U772	$4.95	$4.81	$5.16	$4.94	$5.48	$6.35	$6. 3	$6.50	$6.22

Richard's Co.

Part #	Vendor #	2004	2005	2006	2007	2008	2009	2010	2011	2012
R107000B02	A234	$3.40	$3.40	$3.40	$3.40	$3.40	$3.40	$	$3.40	$3.40
R110000B02	A259	$4.44	$4.64	$5.33	$4.93	$4.94	$6.22	$	$	$5.70
R112000014	B001	$1.69	$1.64	$1.75	$1.69	$1.87	$2.17	$2.17	$	2.12
R105000000	B034	$0.47	$0.46	$0.49	$0.47	$0.52	$0.60	$0.60	$0.62	$0.59
R116000002	B035	$3.80	$3.69	$3.98	$3.79	$4.21	$4.87	$4.86	$4.99	$4.78
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R116000U03	U635	$3.37	$3.37	$3.37	$3.37	$3.37	$3.37	$3.37	$3.37	$3.37
		$4.95	$4.81	$5.16	$4.94	$5.48	$6.35	$6.33	$6.50	$6.22

2nd Company

EDDY'S PURCHASES

Part #	Vendor #	2004	2005	2006	2007	2008	2009	2010	2011	2012
R107000B02	A234	$3.40	$3.40	$3.40	$3.40	$3.40	$3.40	$3.40	$3.40	$3.40
R110000B02	A259	$4.44	$4.64	$5.33	$4.93	$4.94	$6.22	$5.78	$6.59	$5.70
R112000014	B001	$1.69	$1.64	$1.75	$1.69	$1.87	$2.17	$2.17	$2.22	$2.12
R105000000	B034	$0.47	$0.46	$0.49	$0.47	$0.52	$0.60	$0.60	$0.62	$0.59
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R112000012	K234	$1.69	$1.69	$1.69	$1.69	$1.69	$1.69	$1.69	$1.69	$1.69
R113000U02	K234	$2.34	$2.27	$2.44	$2.34	$2.59	$3.0		$3.07	$2.94
R116000U02	K932	$3.80	$3.69	$3.96	$3.79	$4.21	$4.87			$4.78
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		$4.95	$4.81	$5.16	$4.94	$5.48	$6.35	$6.33	$6.50	$6.2

3rd Company

Case Study

Our Approach

- Investigative team approaches interview as operational audit.

- Maps out procurement and inventory processes.

- Establishes that Eddie knew his job duties.

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Case Study

Eddie acknowledges he knew he was supposed to buy based on:

- Price

- Shipping Costs

- Supplier Reliability

- Supplier Capacity

- Site Visits to Supplier

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Case Study

- Had evidence on only Richard's company.

- Obtained signed confession on two more, based exclusively on data analysis.

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Case Study

- Total kickbacks: $1.3 million.

- Recovered $924,000 the next day.

- Recovered rest from insurance company.

Ex-Purchasing Agent Sentenced

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Case Study

- Why the steady pricing?
- Math on fluctuating prices was too complex.
- Eddie didn't want to do the kickback math.

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Goal of Data Analytics

Identify **suspicious transactions**.

Identify patterns of possible **fraud** and insider schemes.

Identify **unnecessary spending.**

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Designing Data Analytics

What **businesses processes** are at risk?

What data is available?

What **fraud schemes** are possible?

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Designing Data Analytics

Bottom line:

What Do We Want to Know?

There are hundreds of possible analyses.

What Do We Want to Know?

Vendor Schemes

What Do We Want to Know?

Are suppliers paying kickbacks to your agency's buyers?

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What Do We Want to Know?

Is your agency paying
fictitious vendors?

Are vendors
overbilling?

Are employees
self-dealing?

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Approach:

- Identify relationships between agency buyers and vendors.

- Identify agency buyers who own companies, a vehicle for kickbacks.

- Create "models" to identify high-risk vendors.

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Exercise 1

- Merge the **employee** and **vendor** master files. (Include temporary employees, independent contractors, terminated employees, and employees on workers compensation leave.)

- Identify when an employee and a vendor share the **same address**, cell phone number, home phone number, fax number, email address, or **bank account number**. Test each data field separately.

- Investigate anomalies.

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Exercise 2

- Identify instances in which a **reference** or an **emergency contact** for an employee is also a vendor.

- Determine if the employee brought in the vendor and whether the vendor is receiving **increasingly more revenue** from your agency.
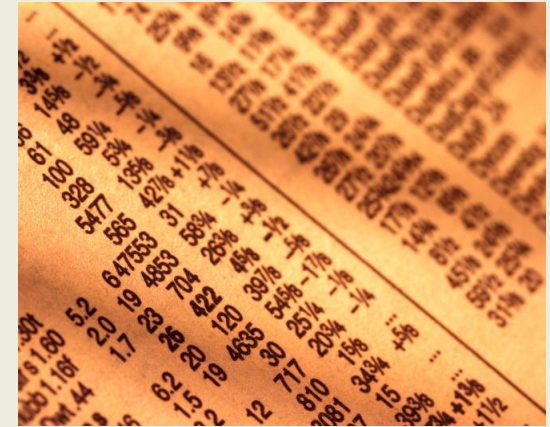
Exercise 3

- Identify instances in which the **health** or **life beneficiary** of an employee is also a vendor.*

- For vendors with significant amounts of revenue, investigate **how** and **when** the company became a vendor and whether the employee was responsible for bringing in the vendor.

- Ensure **legitimacy** of vendor.

  * In compliance with HIPAA laws.

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Exercise 4

- Identify companies being paid that are not on the approved vendor list.

- If number of unapproved vendors is substantial and routine, identify **unapproved vendors** that appear on other lists requiring greater scrutiny. (Modeling)

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Exercise 5

- Identify vendors with nearly identical names. Ensure funds designated for one have not been diverted to the other – a **common ploy**.

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Exercise 6

- Identify employees in the Accounts Payable Department or characterized as buyers and search **Secretary of State** records to determine if they are principals or registered agents of any company.

- Determine **whether these companies are vendors** of your organization.

- Investigate to ensure no conflict exists.

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Exercise 7

Look for **unusual increases** in vendors' prices or rates in conjunction with other indicators of risk.

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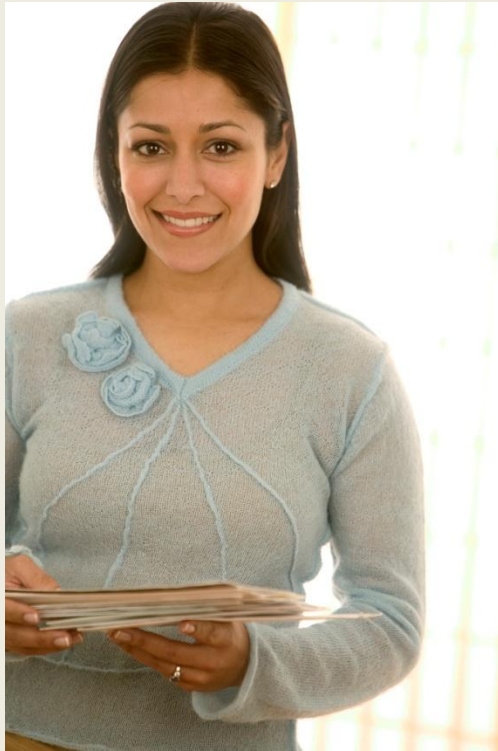
Exercise 8

Look for **unusual numbers of adjustments** to invoices after they have been approved.

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Exercise 9

Identify contractors whose invoices are submitted with **sequential invoice numbers**.

Exercise 10

Identify contractors with large numbers of **change orders**.

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Exercise 11

Upload labor payments and identify duplicates or overbilling.

News Article

A South Side contractor billed the city school system for hundreds of hours of labor for 10 pipefitters named Usher, but five of them say they never worked for the company, a Chicago Sun-Times investigation has found.

The Chicago Board of Education has been billed $2.6 million over the last five years by the company, Arthur J. Usher and Sons, which operates from a residence in the Beverly neighborhood.

The company submitted bills for work by Art, Bill, Charles, Dave, John, Mike, Pat, Paul, Pete and Robert Usher along with two other workers.

But Charles, Dave, Pete, Robert and John said they have never worked for Arthur Usher and Sons. And William Usher, the father of the other Ushers, said his son Paul is not a pipefitter….

What Do We Want to Know?

Credit Card Schemes

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What Do We Want to Know?

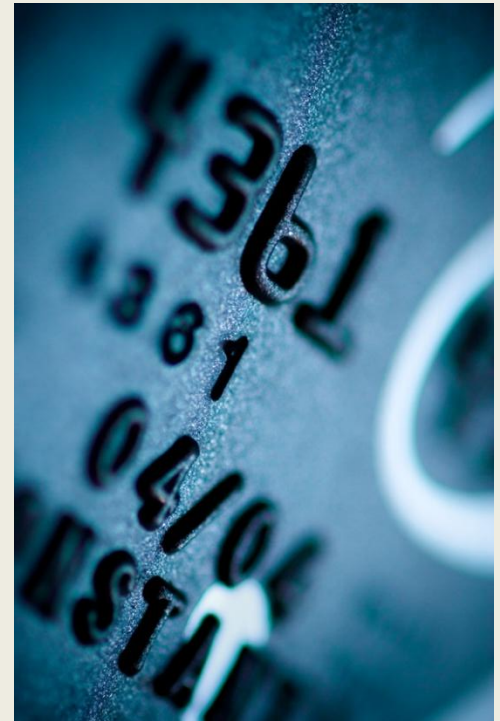Is your agency paying for items or services for employees' **personal use**?
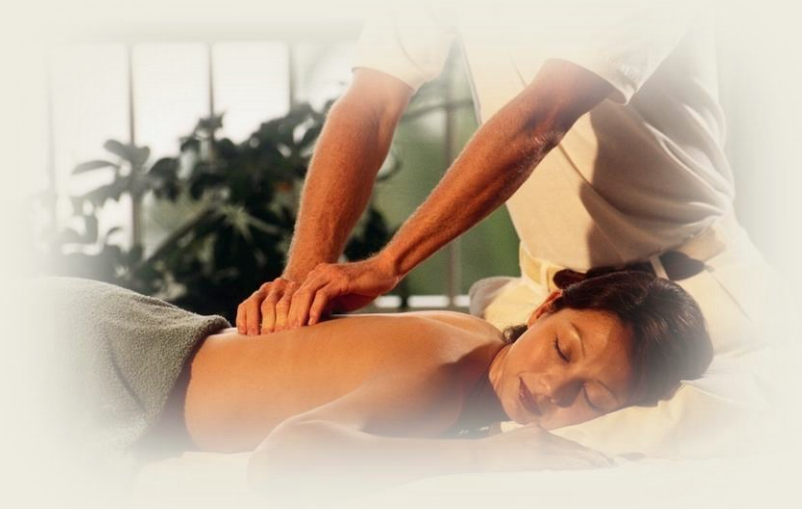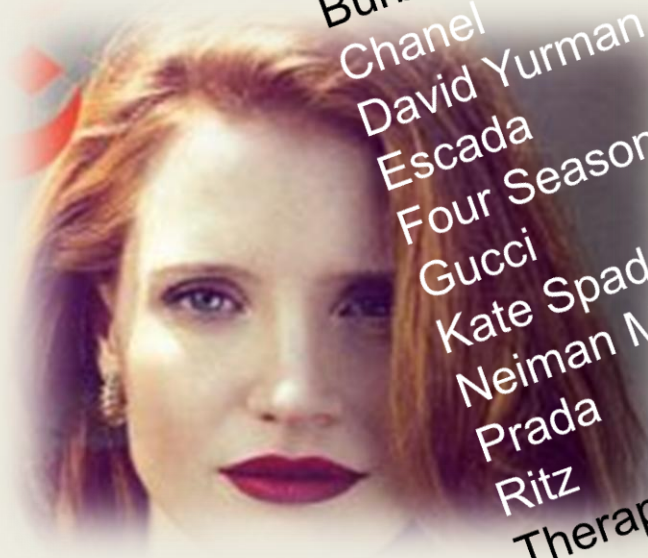
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Exercise 12

Conduct pattern analysis on **credit card expenditures**. Identify individuals, sites, and vendors with largest expenditures. Investigate anomalies.

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Exercise 13

- Search credit card records for key words associated with **luxury items.**

Anne Fontaine
Burberry
Chanel
David Yurman
Escada
Four Seasons
Gucci
Kate Spade
Neiman Marcus
Prada
Ritz
Therapeutic Massage
St. John

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Case Study

Analysis of Nearly
$40 Million of
Credit Card Expenditures
Over **Two Years**

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Case Study

Examples of Analyses Conducted

- **Questionable** Expenditures

- Top 25 Spending Categories

- Expenses by Cardholders

- Expenses by Supplier

- Expenses by Location

- **Potentially Inappropriate** Suppliers

- Employees of Interest (145)

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Case Study

Categories of Interest – Examples

- Amusement Parks
- Art Dealers
- Artist Supply Shops
- Barber and Beauty Shops
- Bicycle Shops
- Boat Dealers and Leases
- Bowling Alleys
- Cable T.V.

- Camera Stores
- Charitable and Social Organizations
- Cigars
- Clock, Jewelry Watch Stores
- Clothing Stores (Five Categories)
- Cosmetic Stores
- Crystal and Glassware Stores

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Case Study

Categories of Interest – Examples

- Dentists, **Orthodontics**
- Doctors, Physicians
- Drapery Upholstery Stores
- Dry Cleaners
- **Electric Razor** Stores
- **Elementary**/Secondary Schools
- Fabric, **Needlework**/Sewing **Fireplace** and Accessories Store

- Freezer, Locker Meat
- **Game, Toy** and **Hobby Stores**
- Health and Beauty Spas
- Health Practitioners, Medical Services (**Massages**)
- Hospitals
- **Leather Goods** and Luggage
- **Marinas**

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Categories of Interest – Examples

- Miscellaneous Personal Services
- Motion Picture Theaters
- Motorcycle Dealers
- **Music Stores**
- Opticians, Optometrists
- Orchestras
- Orthopedic Goods
- **Pet Stores**

- **Political Associations**
- Religious Goods Stores
- **Religious Organizations**
- Second Hand Stores
- Sporting Good Stores
- **Stamp** and **Coin Dealers**
- **Swimming Pools**
- **Video Games**

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Top 15 Cardholders	
Cardholder	**Total**
Cardholder 1	$1,153,380.19
Cardholder 2	$696,615.00
Cardholder 3	$453,937.62
Cardholder 4	$417,220.99
Cardholder 5	$380,813.44
Cardholder 6	$372,012.27
Cardholder 7	$349,520.95
Cardholder 7	$308,654.74
Cardholder 8	$261,736.34
Cardholder 9	$235,557.96
Cardholder 10	$226,086.81

Case Study

Example of Questionable Cardholder

Made **873 transactions** totaling **$245,304** over two years.

- **Pajamagram** Company: **$115.75**
- Karen Neuburger **Pajama** Store: **$104.00**
- Cigar Store in Nevada: **$391.50**
- Coheso **CalorieSmart Tracker**: **$117.90**
- American Express - **$16k**
- Savoy Hotel in London - $4,757.35
- Eaglewood Resort and Spa - **$2k**
- **Four Seasons Hotel** in London - **$2,303**
- The **Breast Cancer** Site - **$1,070.85**
- TheSportsAuthority.com - **$792.95**
- Leave It to Us Events - **$1,350.00**
- SitClose Tickets, LLC - **$2,799.00**

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Case Study

Example of Questionable Cardholder

*Made **111 transactions** totaling **$31,384** over two years.*

- Kohl's
- Best Buy
- JC Penney's
- Wal-Mart
- Target
- Bath and Body Works

- Tower Record Store
- Sporting Goods Store
- Kroger
- Sports Apparel Shop

Case Study

Third Year after Two Years of Analyses

Number of transactions dropped by **45,216.**

Credit card expenses dropped by $16.37 million over three years.

Credit Card Expenditures		
Credit Card Analysis Began After Year One		
	# of Transactions	Dollar Amount
Year 1	81,339	$26.9 million
Year 2	45,216	$16.37 million
Year 3	36,123	$10.53 million

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Project Challenges

- Data was not consistently **categorized**.

- **Fields** were not consistently labeled.

- Categories were **not created to detect fraud** or identify significant trends.

Meals/Food	**Bakeries**
Meals/Food	**Bars, Lounges**
Meals/Food	**Candy, Nut, Confectionary**
Meals/Food	**Caterers**
Meals/Food	**Eating Places, Restaurants**
Meals/Food	**Fast Food Restaurants**
Meals/Food	**Freezer, Locker, Meats**
Meals/Food	**Miscellaneous Food**
Meals/Food	**Package Stores**
Meals/Food	**Supermarkets**

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Project Challenges

Multiple Name Variations *(Fictional Example)*

- De-Tendre's Bathroom Supply
- De-Tendre's Bathroom Supplies
- De Tendre's Faucet
- De Tendre's Inc
- De-Tendres Supplies
- De Tendres
- De Tendre's Inc.
- Bathoom Supply, De Tendre's
- De-Tendre Faucets

- De*Tendre's, Inc.
- De*Tendres
- De*Tendre's®
- De'Tendre's
- Detendre, Inc.
- Detendre's, Inc.
- DeTenders Faucet Co
- De-Tendre's, Inc.

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Project Challenges

- **Data error** entries were common.

- Abbreviations differed.

P,O. Box 123
P.O. Box # 123
PO Box @ 123
123
PO 123
Ste. 123
Suite 123

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Project Challenges

Preparing ("cleansing") the data was a **painstaking** process.

P,O. Box 123 = PO123
P.O. Box # 123 = PO123
PO Box @ 123 = PO123
123 = PO123
PO 123 = PO123
Ste. 123 = PO123
Suite 123 = PO123

What Do We Want to Know?

Payroll Schemes

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What Do We Want to Know?

Is your agency paying "ghost" employees?

Are employees billing for time that they did not work?

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Exercise 14

Determine whether two or more employees use the **same Social Security number.**
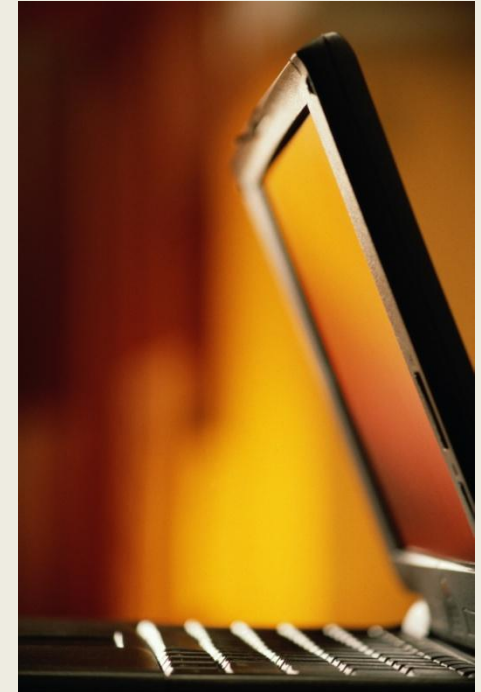
Exercise 15

Determine whether **two or more employees** use the **same address**, cell phone number, home phone number, email address, **bank account number,** or emergency contact name or phone number. If so, verify that they are members of the same household and both are employed with your agency.

Exercise 16

Identify employees receiving paychecks who are **not on HR's Master Employee List.**

Exercise 17

Identify employees with **significant amounts of missing information** in HR database e.g. emergency contact numbers, ethics disclosure statements, training records, employee evaluations, W-9's, health insurance elections, deductions, and so on.

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Exercise 18

Identify paychecks made on **off days, weekends or holidays,** if payment on those days is not a usual practice.

Exercise 19

Identify **gaps** in check number sequences to identify **missing checks** in the payroll registry. Match those against bank accounts to determine if the missing checks were paid.

Exercise 20

Compare terminated employees, employees on workers compensation rolls or employees receiving pension payouts with **payroll list.**

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Exercise 21

Obtain list of employees and **overtime pay.** Sort from highest to lowest paid. Investigate circumstances around those with **highest amounts** of overtime pay.

Exercise 22

Investigate individuals paid **more than 24 hours a day**.

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Exercise 23

Look for

duplicate paychecks.

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Exercise 24

Identify **number of checks per employee** issued in the same year. Look for outliers.

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Exercise 25

Conduct **trend analysis of payroll** to identify large increases in pay per employee or other unusual patterns.

Case Study – Payroll Fraud

- Analysis of approximately $7 billion of payroll expenditures.

- "Proof of Concept" project to identify "red flags" of fraud or irregular patterns.

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Preliminary Findings

- Nearly 100 instances in which active employees were paid more than $10,000 in a single pay period.

- Dozens of instances in which active employees were paid for more than 500 hours.

- About 500 instances in which large payments were made over multiple pay periods.

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Preliminary Findings

- Hundreds of employees associated with addresses outside of the geographical area of their work location, many of them hundreds of miles and across the country.

- Many manual and off-cycle checks. Some employees with no taxes withheld.

- Dozens of active employees not associated with any address.

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Questions?

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